Dual

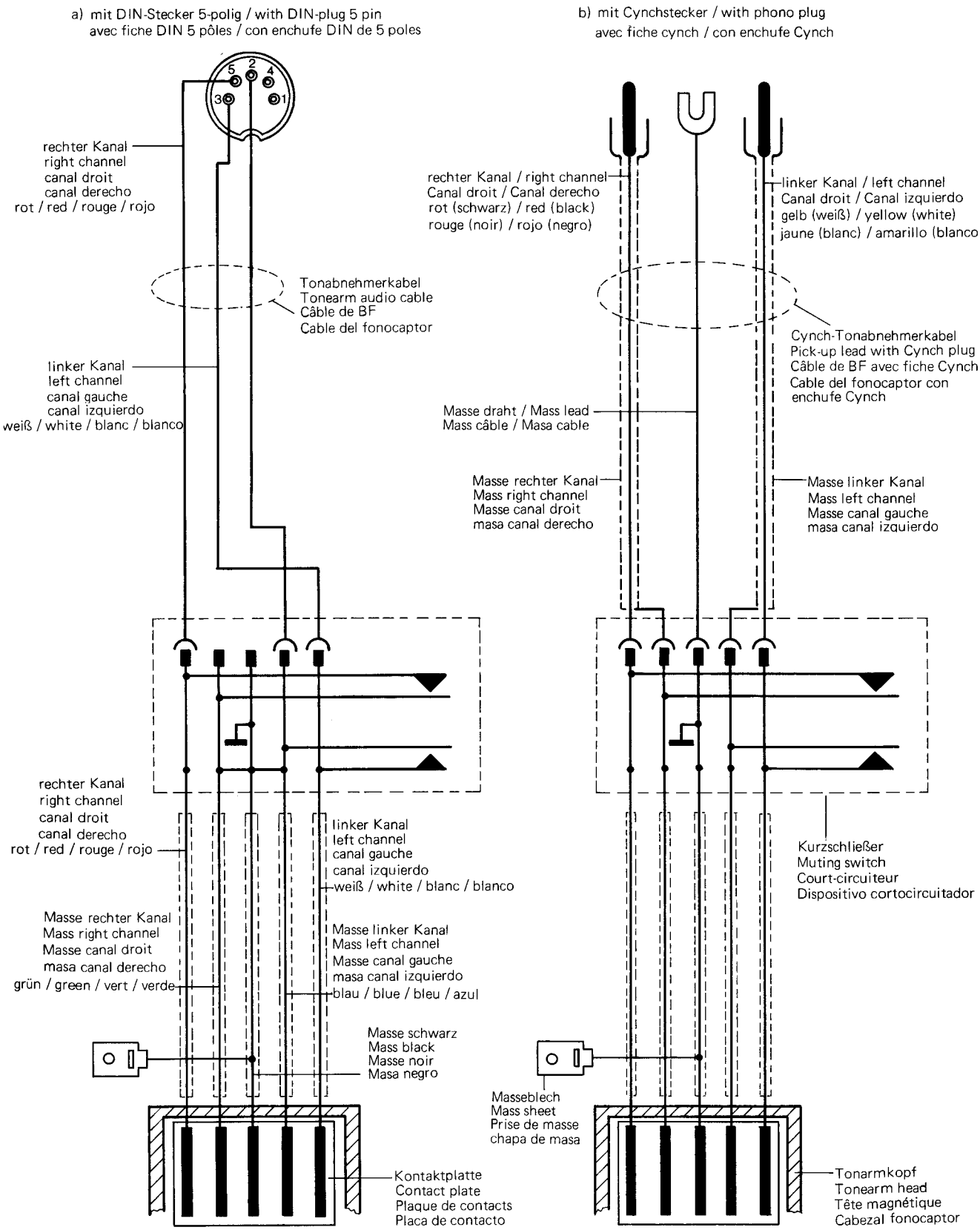
521

Edition August 1978

Service Manual

Dual Gebrüder Steidinger 7742 St.Georgen/Schwarzwald

Fig. 1 TA-Anschlußschema / Audio Connection Diagram / Schema de branchement / Esquema de conexion del fono captor



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Specification

Mains frequency	50 or 60 Hz; use associated motor pulley
Maind voltage	110 – 130 V or 220 – 240 V, pluggable
Drive motor	Dual model, 8-pole, synchronous
Drive	by motor pulley-to-turntable belt
Power consumption	10 watts approx.
Current drain	75 mA at 220 volts, 50 Hz; 140 mA at 117 V 60 Hz
Turntable	non-magnetic, dia. 304 mm, weight 1.2 kg
Record speeds	33 1/3 and 45 revolutions per minute (rpm)
Tone arm lift	automatic, coupled to speed selection
Pitch of tone	adj. range about 1 semitone (6 %), both speeds
Wow and flutter	less than ± 0.1 % by test standard
Signal/noise ratio	instrinsic min. 60 dB, external min. 40 dB
Tone arm	tubular anti-torsion metal tube
Tone arm bearings	universal four-point gimbal suspension
TA brg. friction	vertical less than 0.10 mN ref. to stylus point horizontal less than 0.40 mN ref. to stylus point
Tracking force	continuously adjustable in the range 0 – 50 mN (0 – 5 gr); reliable operation with 5 mN (0,5 gr) and higher
Pickup head	detachable, accpets all Dual snap-in cartridges and all other 1/2" systems weighing between 4.5 gr and 10 gr, mounting material included
Weight	4.1 kg

For dimensions and bench cutout, refer to Installation Instructions.

Fig. 2

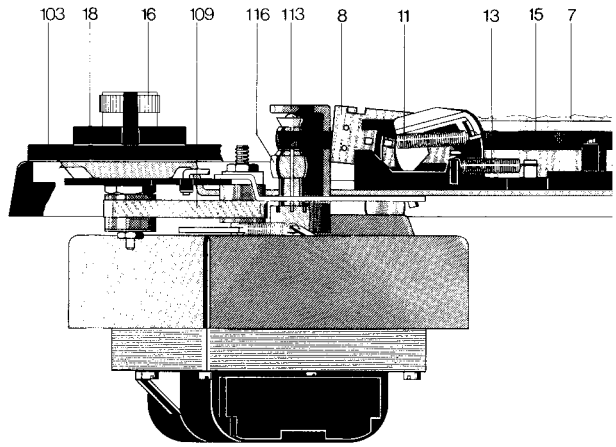


Fig. 3

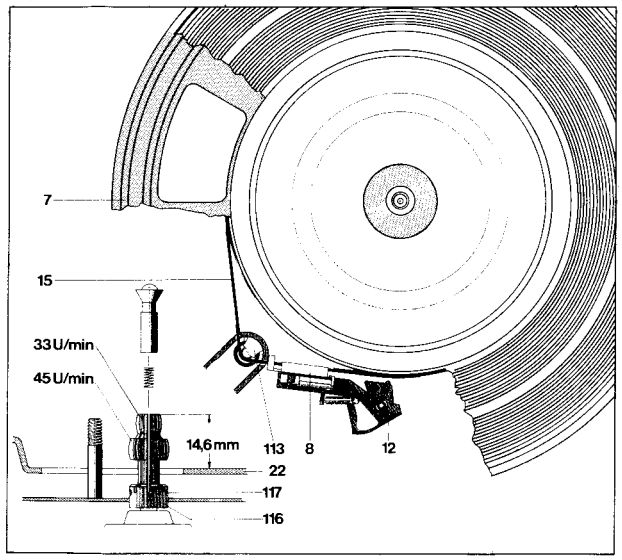
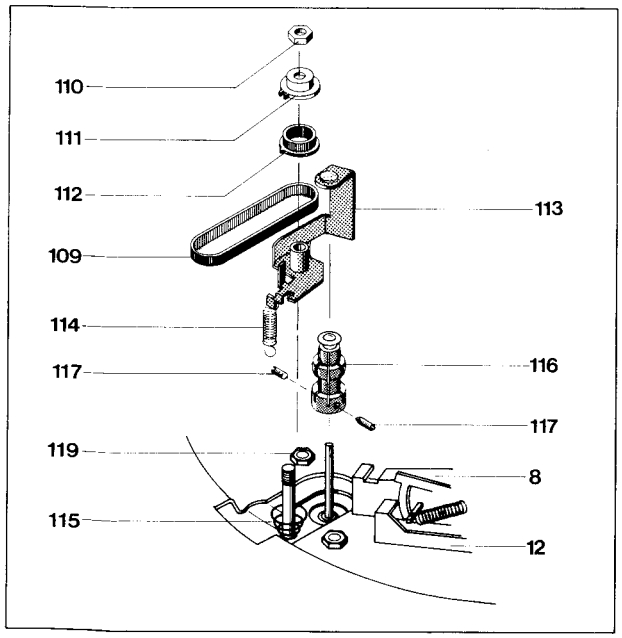


Fig. 4



NOTE: The item numbers mentioned in the text refer to the illustrations, exploded views (page 12) and Parts List.

Motor and Drive

Turntable and mechanism are driven by the motor (132) (see Fig. 21). This shaded-pole motor runs vibration-free in radially elastic mounts and has extremely low magnetic leakage.
The motor speed is indpendent of voltage, temperature, and load variation. It can only fluctuate with the mains frequency. Two motor pulleys permit adaptation to the mains frequency of either 50 or 60 Hz; one pulley (116) is showin in both Fig. 2 and Fig. 3.

For 50 Hz use the pulley part no. 234 453,
for 60 Hz use the pulley part no. 234 454.

The driving force is transmitted to the turntable (7) by belt (15).

Speed Selection

To adjust the turntable speed to either 33 1/3 or 45 rpm, the belt (15) is shifted to the one step of pulley (116) with the associated diameter (see Fig. 3). This is achieved when you adjust the speed lever (18) so that the START/STOP lever (48) and the spring lever will move the change-over lever into the desired (33 or 45 rpm) position. When the record player is turned off, the change-over lever is blocked by the blocking bar (12) and the speed is just preselected. Only when the turntable (7) starts running, the blocking bar (12) will release the change-over lever. The latter will then shift the belt (15) to that step of motor pulley (116) which corresponds to the desired speed.

Turntable

The turntable (7) is secured to the turntable bearing tube by the lock tab (151).
To remove the turntable, lift its top layer through one of its cutouts and rotate the turntable until the cutout is positioned above the motor pulley. Remove the belt (15) from the motor pulley (116) and place it onto the turntable.
Continue rotating the turntable until the cutout is positioned above the turntable lock tab (151); press the latter outward and lift off the turntable. Slacken the screw (150).

Belt

To replace the belt (15), first remove the turntable as above described, then separate the belt from the turntable (7). Mount the new belt on the turntable..
NOTE: the ground (mat) surface of the belt should face the driven part. Install the turntable and place the belt (15) over the motor pulley (116).

To Replace the Motor Pulley

1. Separate the belt (15) from pulley (116) and remove the turntable. Remove the toothed belt (109).
2. Disengage the tension spring (114) from the shield (122).
3. Unscrew the hex. nut (110), remove the setting cam (111), belt pulley (112), and counter bearing (113).
4. Slacken the grub screws (106) and slide off the motor pulley (116). Slide the replacement pulley onto the motor shaft. Remove the taper sleeve. Pay attention on the internal distance roller. Position the motor pulley (116) at proper height above the mounting plane, see Fig. 3. Uniformly tighten the grub screws (117). Put the taper sleeve into the motor pulley (116).
5. Mount the counter bearing (113), the belt pulley 1 (112) and the setting cam (111) and secure them in place with hex. nut (110). Install the tension spring (114) and the toothed belt (109).
   Mount the turntable. Pull the belt (15) and place it around the motor pulley (116).
6. Turn the kno (16) to adjust the belt pulley to its mid position. (The nose of the belt pulley (112) should point to the motor pulley center line.) Adjust the hex. nut (110) to the rated speed; the speed increases when you turn the nut clockwise and vice versa.

Stroboscope

Even during the play mode the stroboscope can be used to check the accuracy of the turntable speed adjustment to 33 1/3 and 45 rpm.
Accurate adjustment is manifested by seemingly motionless bar marks of the stroboscope. If the marks run in the same direction as the turntable, the speed is too high and vice versa.
To vary the adjustment, operate the "pitch" knob (16). The strobo marks on the turntable rim, shown in Fig. 12, have the following meanings (starting from the lowest row): 33 1/3 rpm at 60 Hz, 33 1/3 rpm at 50 Hz, 45 rpm at 60 Hz, 45 rpm at 50 Hz.
To exchange the glow lamp Gl (245), remove the screws (248) and the strobo case (244).

Fig. 5

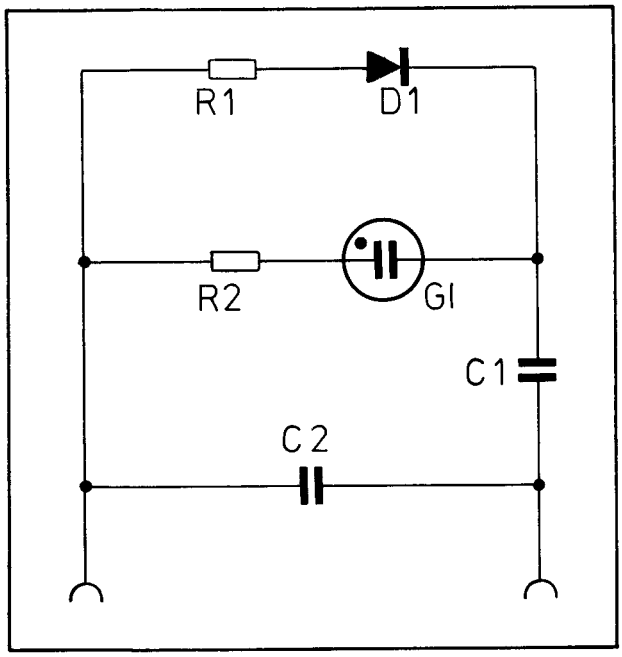
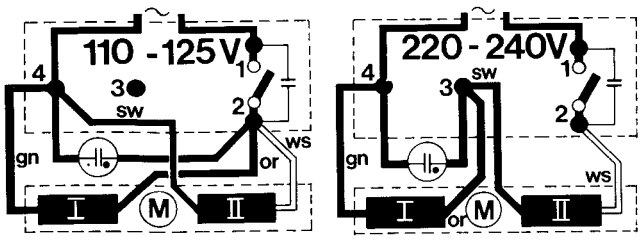


Fig. 6 Motor connection scheme



Tuning to the Pitch-of-tone Level

This feature is independent of the power and controls both turntable speeds. The tuning range is max. 6 % or about one semitone.
When you rotate the knob 16, you will move the belt pulley 2 (105). This motion will be transferred by the toothed belt (109) to the belt pulley 1 (112 in Fig. 9). As a result, the counter bearing (113) and taper sleeve of motor pulley (116) are shifted upwards or downwards, respectively. The taper sleeve of the motor pulley (116) causes the pulley diameter to be reduced or increased, which permits the variation of the rated speed within the said range of ±3 %.

Fig. 7

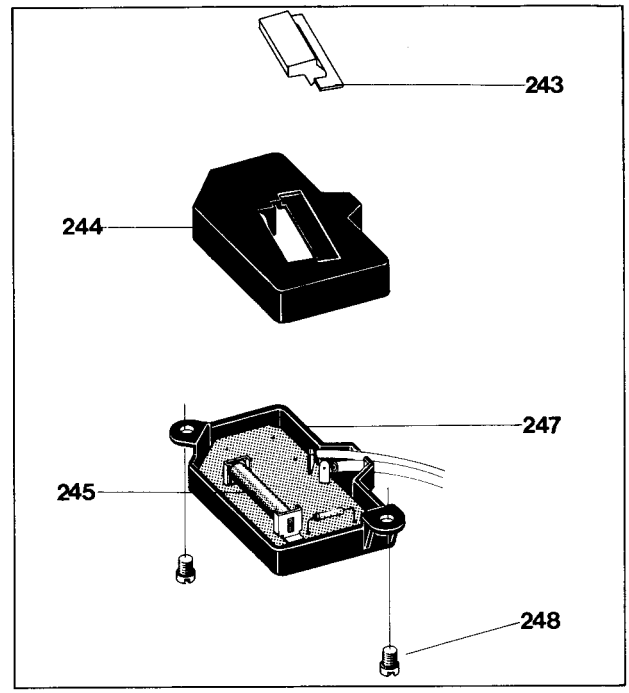


Fig. 8

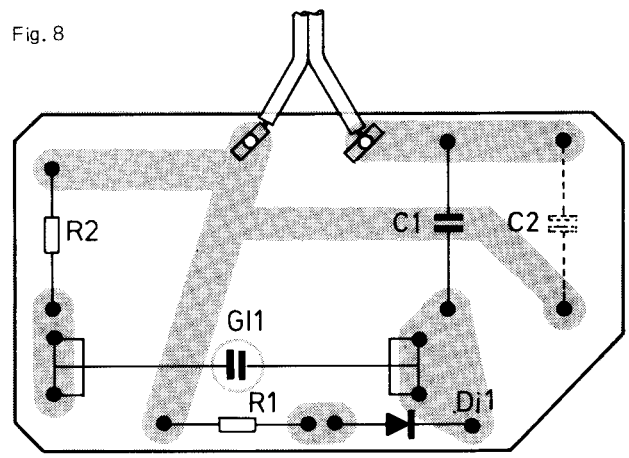


Fig. 9

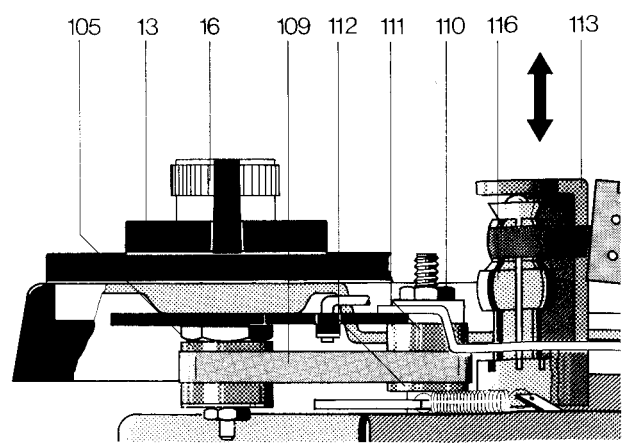
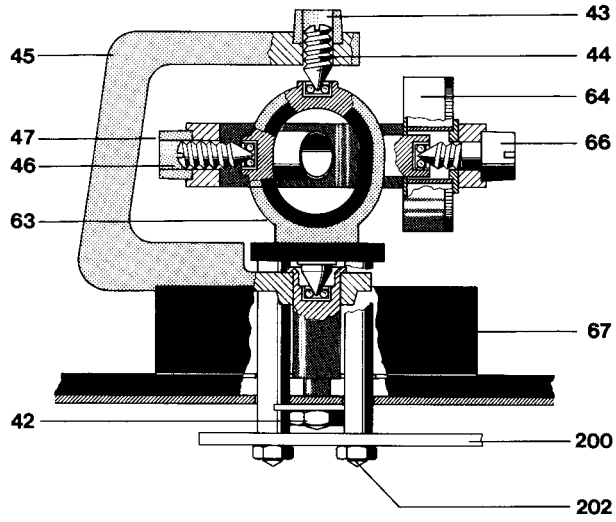


Fig. 10



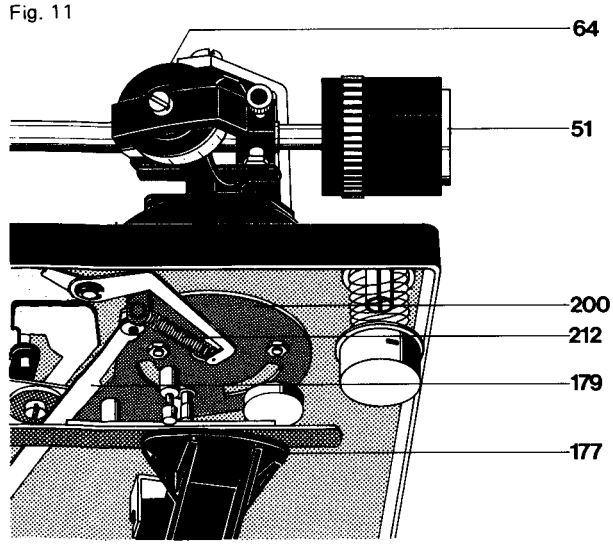
To Replace the Spring Case

Remove the tone arm (58) from the bearing frame (55) as described on this page. Slacken the lock nut (47) and the grub screw (46). Unscrew the bearing screw (66).
NOTE: Left-hand thread.
Lift the bearing frame (55). Remove washer (65) and spring case (64). When reassembling, make sure the helical spring snaps into the cutout of bearing frame (55). Slide-in the washer (65). Tighten the bearing screw (66). Install the tone arm (50). Adjust the bearing backlash with the grub screw (47) and the lock nut (46) as below described.

To Adjust the Tone Arm Bearings

Exactly balance the tone arm. Both bearings should have a small, just perceptible backlash or play. Proper adjustment of the horizontal bearing is achieved if the tone arm can freely slide from the record inside to outside while the anti-skating adjustment is 0.5. Proper adjustment of the vertical bearing is achieved when the carefully kicked tone arm swings into balanced position.. Adjust the backlash by grub screws (44) and (46) for the horizontal and vertical bearing, respectively.

Fig. 11



Tone Arm with Bearings

The light-weight torsion-resistant aluminum-tube tone arm has a universal gimbal bearing characterized by four hardened and lapped steel points located in high-precision ball bearings. The tone-arm bearing friction is thus reduced to a minimum, namely

less than 0.10 mN or 0.010 gr in vertical and
less than 0.40 mN or 0.040 gr in horizontal direction,

referred to the stylus point.

This ensures particularly satisfactory tracking conditions. Before adjusting the tracking force, which should comply with the pick-up system used, adjust the tone arm to its balanced position while the tracking-force scale indicates zero. For coarse balancing, shift the weight (51) with mandrel; for fine balancing, rotate the weight. This weight permits balancing of pickup systems weighing between 4.5 and 10 gr including mounting material.
The tracking force is produced by tensioning the helical spring located in the spring case (64). The latter has a scale with marks permitting exact adjustment of the tracking force within the range 0 – 50 mN (or 0 – 5 gr).

To Remove the Tone Arm from its Bearing Frame

1. Mount the record player in the servicing fixture (repair ijg). Remove the weight (51) and tensioning screw (58). Adjust the scale of the spring case (64) to zero.
2. Turn the record player into head position. Remove the shield (149). Unsolder the tone-arm leads from the muting switch (146).
3 Record player in normal position. Screw the two mounting screws (60) counterclockwise until they abutt against the bearing frame (55).

NOTE: Bayonet union. Shift the tone arm to the rear and lift it from the bearing frame (55).

To assemble, proceed in reversed sequence.

To Remove Tone Arm Complete with Bearings

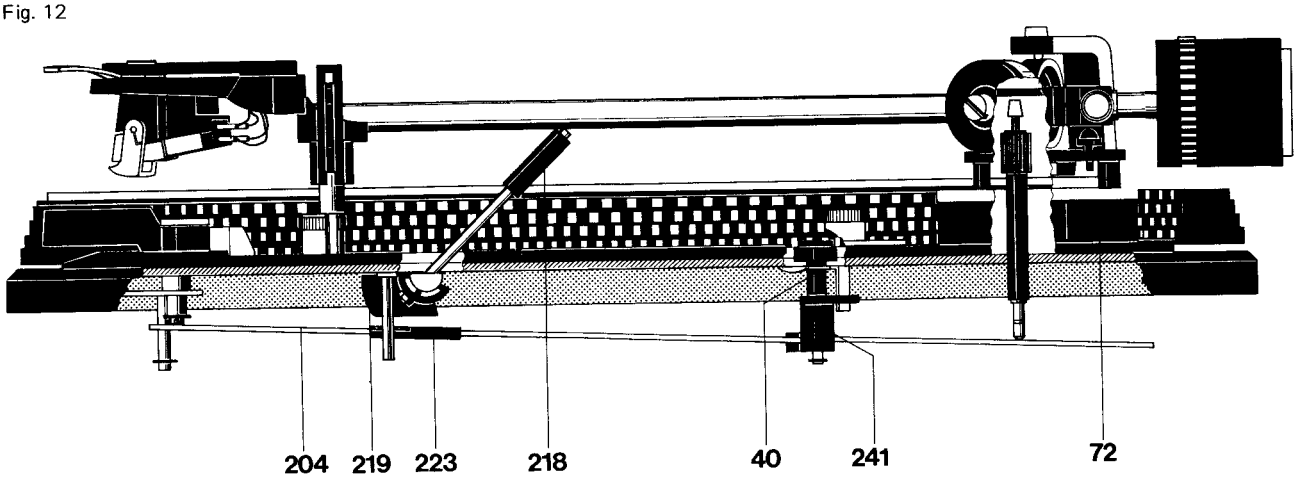
1. Mount the record player in the repair jig. Adjust the tracking-force scale on the spring case (64) to zero. Lock the tone arm (50) in place. Remove the weight (51).
2. Adjust record player to head position. Remove the shield (149). Unsolder the tone-arm leads from muting switch (146).
3. Remove the main lever (177). Remove the lock washer (242). Rotate the set screw (42) until guide bearing (241) and setting bar (228) come free. Remove lock washer (228) and setting bar (204).
4. Unlock the tension spring (212), loosen the lock washer (216) and remove skating lever (215).
5. Remove lock washer (202) from segment (200).
6. Remove hex. nuts (202) and segment (200).
7. Hold the tone arm (50). Remove hex. nut (42) and washer (41). Remove tone arm complete with bearings.

To install the tone arm, proceed in reversed order.

Anti-Skating Device

To adjust the anti-skating force, operate the pointer scale provided on the cover (67). Depending on this adjustment, the skating lever (215) will be deflected from the tone-arm pivot point. The anti-skating force is transmitted by the tension spring (212) to the segment (200) and thus to the tone arm (50).
The factory adjustment is optimal for any stylus having a spherical tip radius of 15 µm or elliptical of 5 – 6 and 18 – 22 µm as well as for CD 4 pickup systems.
These factory-adjusted values may be varied only in an authorized Dual service workshop using a Dual Skate-O-Meter and a test record.

Fig. 12



Tone Arm Lift

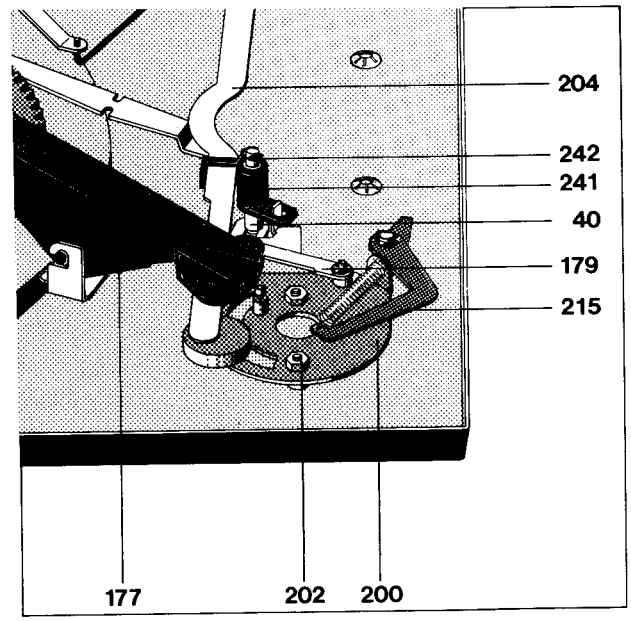
When you move the lift control bar (218) to the LIFT position ▼, the tone arm will be lifted and in position LOWER ▼ it will be lowered through the lift cam (219) and the setting bar (204). The tone arm lift has priority over the set-down mechanism. When the record player is started with the control bar (218) in the LIFT position ▼, the set-down mechanism will move the tone arm across the record in the auto mode. Lowering of the tone arm will take place only after you have adjusted the control bar (218) to the POWER position ▼.
The height of lift should be 3 to 5 mm; it can be adjusted by the setscrew (40).

To Replace the Lift Plate (158)

1. Remove the main lever (177) and the lock washer (242). Rotate the setscrew (42) until guide bearing (241) and setting bar (204) are released. Remove lock washer (228) and setting bar (204).
2. Unhook the tension spring (212), loosen lock washer (216) and remove skating lever (215).
3. Remove lock washer (206) and disk (205). Detach the shut-off bar (179) from segment (200).
4. Remove hex. nuts (202) and segment (200).
5. Remove the screws (15) and the lift plate (158).

To reassemble, proceed in reversed order.

Fig. 13



Tone Arm Control

The tone arm motions for auto lowering and lifting are controlled by cams under the cam wheel (161) while the wheel rotates through 360°.
Lifting and lowering motions are controlled by the main lever (177) and lifting bolt while the horizontal motions of the tone arm are controlled by lever (177) with the segment (200).
The lifting/lowering mechanism is active for 30-cm and 17-cm records; it is coupled to the turntable-speed change-over function.
The tone-arm set-down points are determined by the spring pin of segment (200) abutting against the setting bar (204). The horizontal motion is limited by the segment abutting against the setting bar (204) which is lifted only during the set-down operation by the main lever (177) and thus comes into the sluing range of the spring pin provided on the segment.

After the tone arm has been set down on the record, the setting bar (204) is released and returns to its nromal position, thus escaping from the range of the spring pin. The tone arm is thus free to move in horizontal direction during the play-back.

Fig. 14

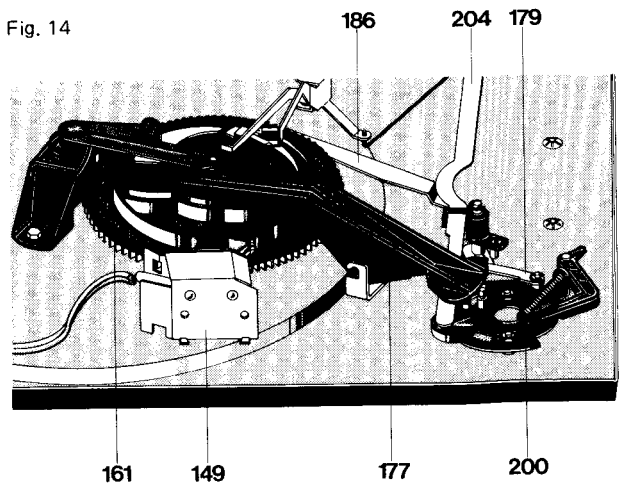


Fig. 15

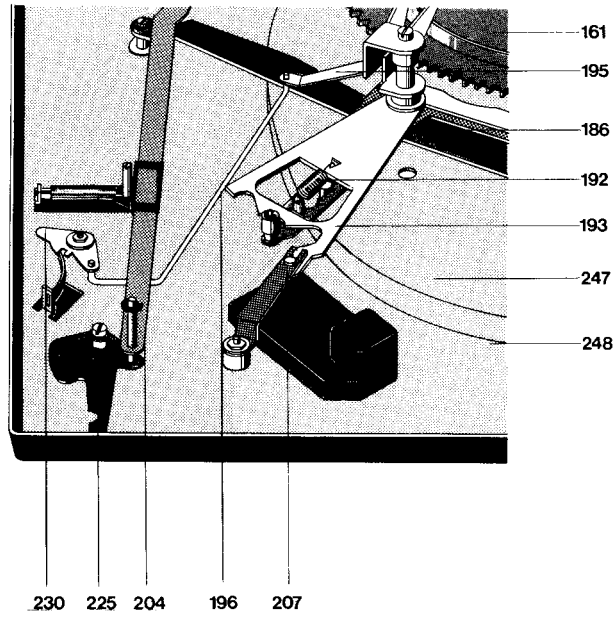


Fig. 16

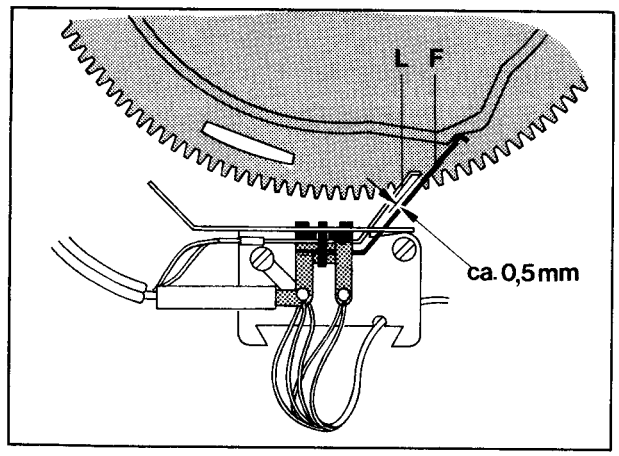
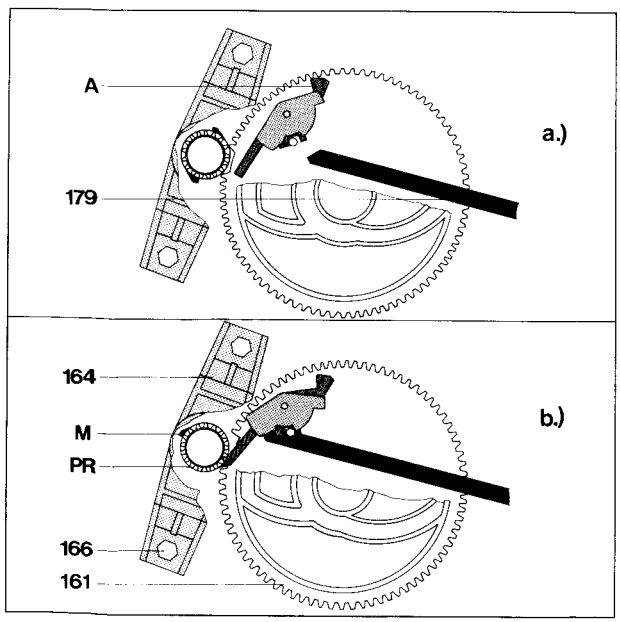


Fig. 17



The Starting Sequence

When you adjust the START/STOP lever to the START position, the turn-on lever (207) is rotated to the outside and will trigger the following functions:

a) The turn-on lever (207) rotates the shift links (193) seated on the riffled pins (183). At the same time, the power switch is turned on (135) and both the motor (132) and turntable start rotating.

b) The shift link (193) enters the range of the reversing lever which is forced into its start position by the subsequent rotation of the cam wheel (161).

c) Operation of the START/STOP lever (48) will also release the start angle (191) that is pulled towards the cam wheel by the tension spring (192). The shut-off lever is thus brought into the range of dog M on the turntable pinion (PR) (Fig. 17) and the cam wheel is driven.

Manual Start

When the tone arm is guided towards the record manually, the pawl (236) coupled to the shift arm (186) will engage with the square bolt mounted in the deck plate and will keep the shift arm in this position. Coupled to the shift arm is the shut-off lever (189) that will turn on the power switch and thus initiate the turntable rotation. When the run-out groove of the record played has been reached, the tone arm is restored and the record player is turned off by automatic means. If you lift the tone arm before the end of play and put it back onto its support, the bolt of segment (200) will release the engaged position of the pawl (236) so that the shift arm is returned to its initial position and the power switch will turn off.

Continuous Play

This mode is operative when you have adjusted the knob (69) to ∞ . The knob (69) will rotate the reversing angle (231) and the latter is forced into the starting position by the turn-on lever (207) at the end of record, the tone arm is restored to its rest position on the support near the record rim. This procedure will be repeated until the START/STOP lever (48) is adjusted to STOP or the knob (69) is adjusted to no. 1 position.

Muting Switch

The muting switch is provided to avoid noisy lifting and lowering of the tone arm in the auto mode. The contact springs of both channels are controlled by the cam wheel. The resulting short-circuiting of the pickup leads is ineffective in the rest state of the record player.

Adjustment

In the zero position of the cam wheel, a contact separation of about 0.5 mm should exist between the contact springs (F) and the shorting straps (L) in Fig. 16. If necessary, bend the shorting straps. Maintain contact springs in good state by a spraying agent.

Final Shutting-off

The shutting-off and stop functions are controlled by the reversing lever U. Lever U is brought into the stop position by the main lever (177) (longer leg of the reversing lever towards the cam wheel center). The shut-off bar (179) is dragged during the play in proportion to the motion of segment (200). The shutting-off operation after the end of record is triggered by the dog (M) of the turntable (7) and by the shut-off lever (A) in Fig. 17.
In the shut-off range for records 116 – 122 mm in diameter, the shut-off lever (A) approaches the dog under control of the shut-off bar (179). (See Fig. 17 a). The dog (M) engages with lever (A), which will displace the cam wheel (161) from its zero position and make it engage with the pinion (PR) (Fig. 17 b). The main lever (177) returns the tone arm that can then lower itself on its support.
When the cam wheel runs up to its zero-engagement position, the nose (186) of the shift arm can run into the recess left in the cam wheel and operate the power switch (135).

Stop Circuit

When you adjust the lever (48) to STOP, the srart angle (191) is released and pulled towards the cam wheel by tension spring (192). As a result, the shut-off lever is brought within the range of the dog (M) on the pinion (PR) of the turntable and the cam wheel (161) becomes driven. The reversing lever remains in its stop position.

Adjustments

Tone Arm Set-down Point

Slightly pprey up the nameplate "Dual" at its lower left corner and swivel it outwards (Fig. 19). The now accessible opening will show one of the adjusting screws.

Set-down Point for 30-cm Records

Adjust the speed selector (18) to the "45" position and correct adjustment with a screwdriver. If the stylus sets down too far on the record inside, rotate the adjusting screw clockwise. If the stylus is lowered outside the 30-cm record, rotate the screw counter-clockwise.

Set-down Point for 17-cm Records

Adjust the speed selector (18) to the "33" position and rotate the screw as above described for adjustment.

Shut-off Point

In the shutting-off range for records 116 – 122 mm in diameter, the excenter (S) on segment (200) (Fig. 18) can be used to vary the shut-off point.

Fig. 18

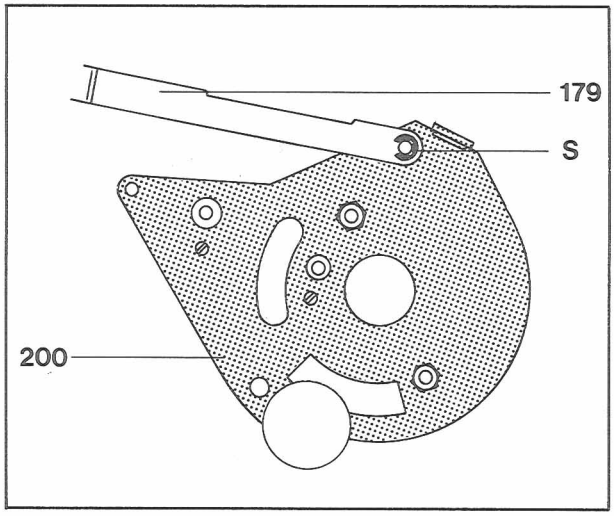
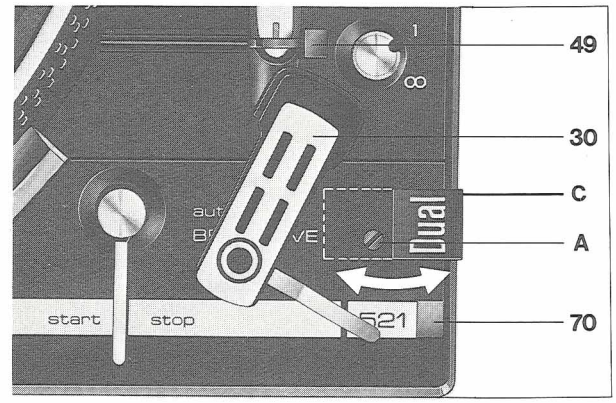


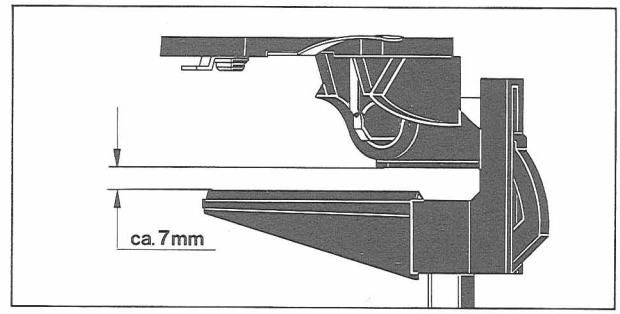
Fig. 19



Tone Arm Lift Height

This height for the auto mode can be adjusted with the aid of the setting sleeve (156). Pull the mains plug. Disengage the tone arm. Rotate the cam wheel (161) out of its zero position until the tone arm has reached its greatest lift height.
The height above the tone arm support stop should be about 7 mm as shown in Fig. 20. If necessary, rotate the setting sleeve (156) clockwise or anticlockwise as required.

Fig. 20



Defect	Cause	Repair
Turntable does not start.	a) Belt is not in place.	a) Mount the belt.
	b) Motor is not powered.	b) Check switch base and mains plug.
	c) Motor pulley has come loose.	c) Tighten it.
Turntable speed unsatisfactory.	a) Motor pulley does not comply with mains frequency.	a) Exchange it.
	b) Belt slips on motor pulley or turntable.	b) Clean all contacting surfaces of belt and pulleys, if necessary replace the belt.
	c) Excessive bearing friction.	c) Clean and relubricate the bearings.

Defect	Cause	Repair
Tone arm improperly lowered (too fast or not on record).	Shock-absorbing action of silicone oil in lift tube is excessive or insufficient.	Demount the lift plate (15), remove the control stud (154), lock washer (155), and setting sleeve (156) with lock washer; remove lift bolt and pressure spring, clean lift tube and lift bolt. Evenly apply WACKER SILICONE OIL AK 500 000 to the lift bolt. Reassemble the parts.
Acoustic Feedback	a) Chassis parts (e.g. connecting leads) hit bench cutout.	a) Align cutout by installation instructions.
	b) Connecting leads are strained.	b) Loosen or extend the cables.
Rated speed borders pitch adjustment range.	Positioning of belt pulley (1) is inaccurate.	Adjust knob (16) to mid position; adjust hex. nut (110) to rated speed (clockwise adjustment will increase the speed and vice versa).

Safety regulations

Servicing of electronic equipment should be performed only by authorized service personnel.
During service the unit has to be operated with an isolated transformer.
Safety requirements (e. g. VDE 0860 H) have to be strictly observed during repair.
In order to not reduce safety, the original design of the unit should not be changed, e. g. cover plates, mechanically secured wiring, tracking and creepage distance in air etc.
Use only factory replacement parts which must be reinstalled per original design.
Upon completion of repair make shure that all accessible and conductive parts do not carry line voltage.

Replacement parts

Pos.	Part.-No.	Qty.	Description	
1	214 054	1	Washer	
4	220 213	1	Centering piece	
6	244 460	1	Turntable lining	
7	246 738	1	Turntable cpl.	
8	234 428	1	Carrier cpl.	
9	210 472	2	Fillister head screw	M 3 x 4
10	210 586	1	Washer	3.2
11	232 086	1	Retaining spring	
12	234 430	1	Locking rail cpl.	
13	232 087	1	Retaining spring	
14	210 194	1	Grip ring	
15	246 084	1	Flat belt	
16	234 912	1	Control knob	
17	232 078	1	Bearing bush	
18	234 910	1	Speed lever	
19	237 222	1	Speed cover	
20	213 260	3	Grooved drive stud	
21	237 414	3	Transport lock	
22	246 740	1	Built-in plate cpl.	
23	237 226	2	Spring suspension cpl. (motor side)	
	237 227	1	Spring suspension cpl. (pick-up arm side front)	
	237 228	1	Spring suspension cpl. (pick-up arm side rear)	
24	230 529	4	Threaded coupling	
25	236 710	2	Pressure spring (motor side)	
	236 711	1	Pressure spring (pick-up arm side front)	
	236 712	1	Pressure spring (pick-up arm side rear)	
26	200 723	4	Rubber absorber	
27	200 722	4	Pot	
30	246 741	1	Pick up head cpl.	
31	237 223	1	Contact plate cpl.	
32	236 242	1	Fixture	TK 24
38	210 472	1	Fillister head screw	
39	234 599	1	Reset cam	

Pos.	Part.-No.	Qty.	Description	
40	240 069	1	Adjusting screw	
41	210 643	1	Washer	4.2/12/1
42	210 366	1	Hex nut	
43	234 635	2	Counter nut	
44	230 063	1	Grub screw	
45	240 962	1	Frame cpl.	
46	234 634	1	Grub screw	
47	234 635	2	Counter nut	
48	244 785	1	Switch lever	
49	246 744	1	Support cpl.	
50	246 743	1	Pick up arm cpl.	
51	240 964	1	Weight	
52	210 147	1	Locking washer	4
53	238 666	1	Mandril	
54	233 744	1	Stay	
55	242 098	1	Bearing frame	
56	236 160	2	Support plate	
57	239 565	2	Fillister head screw	M 2.5 x 3
58	241 447	1	Clamping screw	
59	238 201	1	Thread plate	
60	238 202	2	Locking screw	
61	237 672	1	Groove drive stud	1.4 x 6
62	238 623	1	Pointer	
63	242 099	1	Bearing cpl.	
64	236 507	1	Spring casing cpl.	
65	237 563	1	Washer	
66	237 564	1	Bearing screw	
67	246 746	1	Rear cover	
68	200 444	6	Spring washer	
69	240 151	1	Rotary knob	
70	246 747	1	Front cover	
100	210 146	3	Locking washer	3.2
101	232 096	1	Switch lever	
102	232 071	1	Clip spring	
103	232 094	1	Connection part	
104	232 079	1	Shouldered nut	

Pos.	Part.-No.	Qty.	Description	
105	232 097	1	Belt wheel II	
106	240 035	1	Washer	
107	210 607	1	Washer	3.2/10/0.5
108	210 362	1	Hex nut	M 3
109	232 076	1	Toothed belt	
110	244 104	1	Hex nut	M 3.5
111	241 641	1	Control curve	
112	241 642	1	Belt wheel 1	
113	241 644	1	Abutment	
114	233 777	1	Tension spring	
115	232 615	1	Pressure spring	
116	234 453	1	Drive roller	50 Hz cpl.
	234 454	1	Drive roller	60 Hz cpl.
117	233 137	2	Grub screw	M 2.5 x 3
119	210 366	2	Hex nut	M 4
120	210 480	1	Fillister head screw	M 3 x 6
121	210 609	1	Washer	3.2/10/1
122	241 328	1	Screen plate	
123	232 841	1	Buffer	
124	232 840	1	Insert plate	
125	241 570	1	Upper bearing stay	
126	209 939	1	Rubber bush	
127	241 569	1	Stator	110/220 V
128	233 815	1	Fillister head screw	M 2.5 x 18
129	241 571	1	Anchor	
130	241 572	1	Lower bearing stay	
131	210 525	2	Fillister head screw	M 3 x 25
132	242 076	1	Motor SM 860-1 cpl.	110/220 V
133	234 592	1	Connecting rod	
135	242 580	1	Mains switch	(10 nF)
	242 583	1	Mains switch	(68 nF)
136	236 335	1	Slide	
137	200 444	1	Spring washer	
138	233 012	1	Switch panel	(10 nF)
	236 605	1	Switch panel	(68 nF)
139	230 148	1	Switch angle	
140	239 732	1	Tension spring	
141	219 200	1	Catch spring	
142	241 883	1	Capacitor	10 nF/250 V
	230 355	1	Capacitor	68 nF/250 V
143	242 095	1	Cover	
144	210 498	1	Fillister head screw	M 3 x 28
145	231 079	1	Cable clamps	
146	232 987	1	Shurt circuiter	
147	239 562	1	Soldering lug	
148	210 472	2	Fillister head screw	M 3 x 4
149	232 084	1	Screen sheet	
150	210 472	2	Fillister head screw	M 3 x 4
151	244 706	1	Holdering rail	
154	216 844	1	Control nipple stud	
155	210 143	2	Locking washer	
156	218 318	1	Adjustable adapter	
157	210 472	2	Fillister head screw	
158	246 749	1	Lift plate cpl.	
161	236 912	1	Curve wheel cpl.	
162	200 522	1	Catch spring	
163	210 366	1	Hex nut	M 4
165	218 155	2	Hex screw	M 4 x 6
166	246 748	1	Bearing bridge cpl.	
172	210 587	1	Washer	3.2/7/1
173	234 677	1	Bearing bracket	
174	210 667	1	Washer	5.3/10/0.5
175	234 676	1	Screw bolt	
176	210 147	1	Locking washer	4
177	236 914	1	Main lever	
178	211 718	1	Ball	
179	234 668	1	Stop rail	
180	234 558	1	Ball bed	
181	210 472	2	Fillister head screw	AM 3 x 4
182	210 362	1	Hex nut	
183	234 544	1	Groove bolt	
184	210 586	1	Washer	3.2
185	236 950	1	Stop bush	
186	234 542	1	Switch arm	
187	229 686	1	Tension spring	
188	210 144	1	Locking washer	1.9

Pos.	Part.-No.	Qty.	Description	
189	234 579	1	Switch off lever	
190	210 145	4	Locking washer	2.3
191	234 545	1	Start angle	
192	229 698	1	Tension spring	
193	244 784	1	Switch crank	
194	245 249	1	Switch over lever	
195	210 146	3	Locking washer	3.2
196	234 598	1	Connecting rod	
200	242 101	1	Segment	
201	234 026	2	Grub screw	M 2.5 x 4
202	210 362	2	Hex nut	M 3
203	223 777	1	Control nipple stud	
204	240 060	1	Slide rail	
205	201 187	1	Sliding washer	
206	210 145	4	Locking washer	2.3
207	244 709	1	Switch on lever	
208	210 641	1	Washer	4.2/10/1
209	210 362	1	Hex nut	M 3
210	234 548	1	Roller	
211	210 143	1	Locking washer	1.5
212	218 591	1	Tension spring	
213	201 184	1	Adjusting washer	
215	244 331	1	Skating lever	
216	210 146	3	Locking washer	3.2
217	237 543	1	Rubber bush	
218	237 541	1	Grip rod cpl.	
219	240 063	1	Lifting piece	
220	210 353	1	Hex nut	M 2
221	240 066	1	Bearing plate	
222	210 469	1	Fillister head screw	M 3 x 3
223	234 674	1	Braking piece	
224	210 587	1	Washer	
225	234 588	1	Adjusting lever	
226	230 087	1	Screw bolt	
227	210 146	3	Locking washer	3.2
228	210 145	4	Locking washer	2.3
229	210 586	1	Washer	3.2/7/6.5
230	232 595	1	Leaf spring	
231	234 593	1	Reversing angle	
232	203 477	1	Washer	2.7/8/1
233	210 353	1	Hex nut	M 2
234	232 599	1	Latch	
235	210 146	3	Locking washer	3.2
236	239 915	1	Square plate	
237	210 472	1	Fillister head screw	M 3 x 4
238	210 586	1	Washer	3.2
239	245 247	1	Screw bolt	
240	239 810	1	Locking spring	
241	229 362	1	Guide bearing	
242	210 145	4	Locking washer	2.3
243	243 621	1	Stroboscope prism	
244	241 574	1	Stroboscope housing	
245	225 321	1	Glow lamp	
246	241 674	1	Switch plate	
C 1	225 332	1	Capacitor	68 nF/400 V/10 %
C 2	224 886	1	Capacitor	47 nF/250 V/20 %
D 1	225 247	1	Diode	BY 183/30
R 1	232 401	1	Resistor	12 kOhm/0.25 W/5 %
R 2	232 402	1	Resistor	22 kOhm/0.125 W/5 %
247	241 675	1	Cover	
248	210 469	2	Fillister head screw	M 3 x 3
249	209 436	3	Tab receptacle	
250	209 424	1	5-pole plug	
251	207 303	1	Phono pick up cable cpl.	
252	207 301	1	Phono pick up cable cpl. (Cynch)	
253	209 425	1	Cynch plug white	
254	209 426	1	Cynch plug black	
255	214 602	2	AMP receptacle	
256	232 996	1	Mains lead cpl. Europe	
257	232 995	1	Mains lead cpl. America	
***	214 120	1	TA fixing material	
***	245 464	1	Operating instructions	
***	245 529	1	Operating instructions UAP	
***	241 278	1	Shipping carton CS	

*** Parts not illustrated

Subject to change!

Fig. 21 Exploded view 2

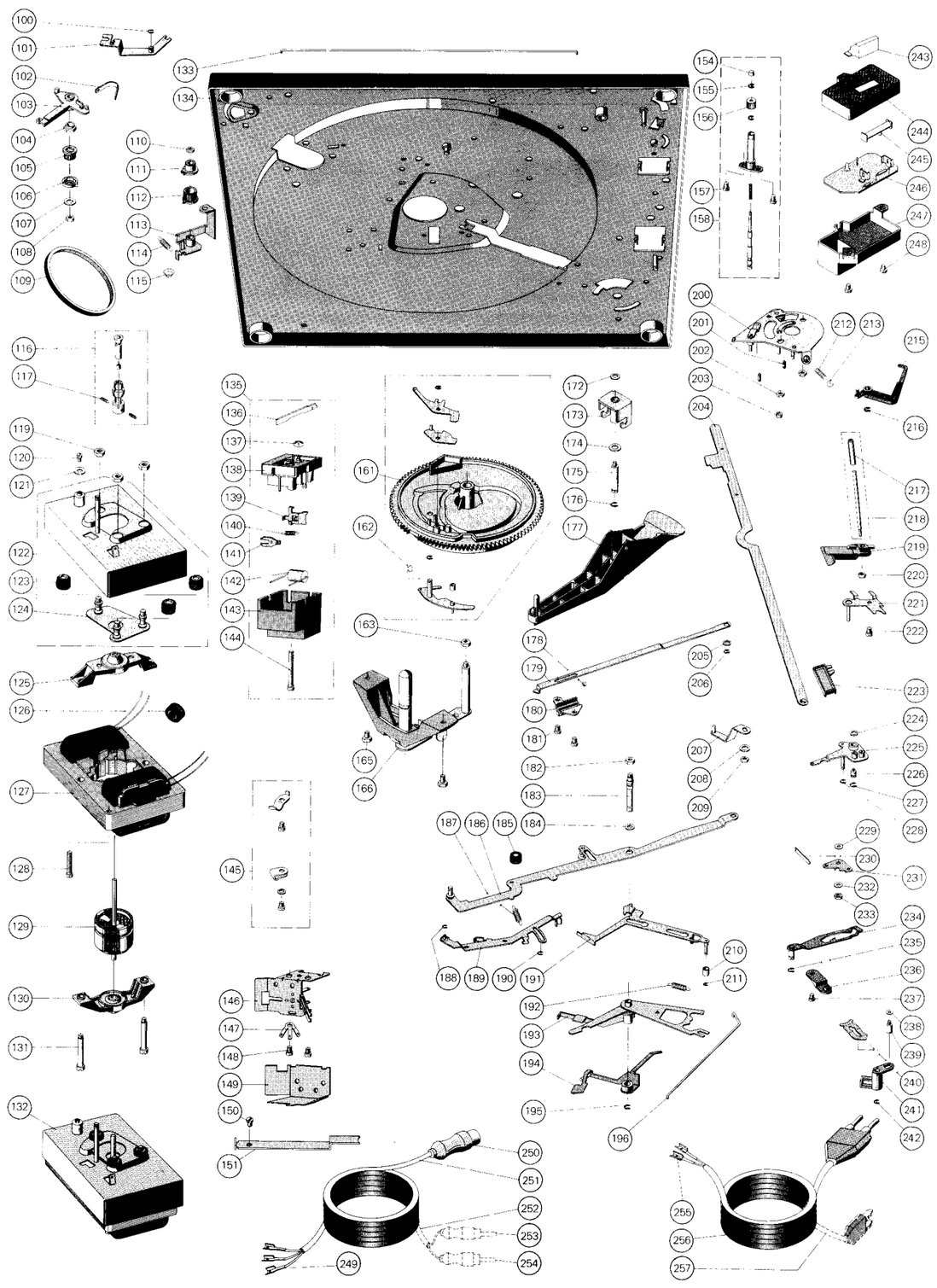
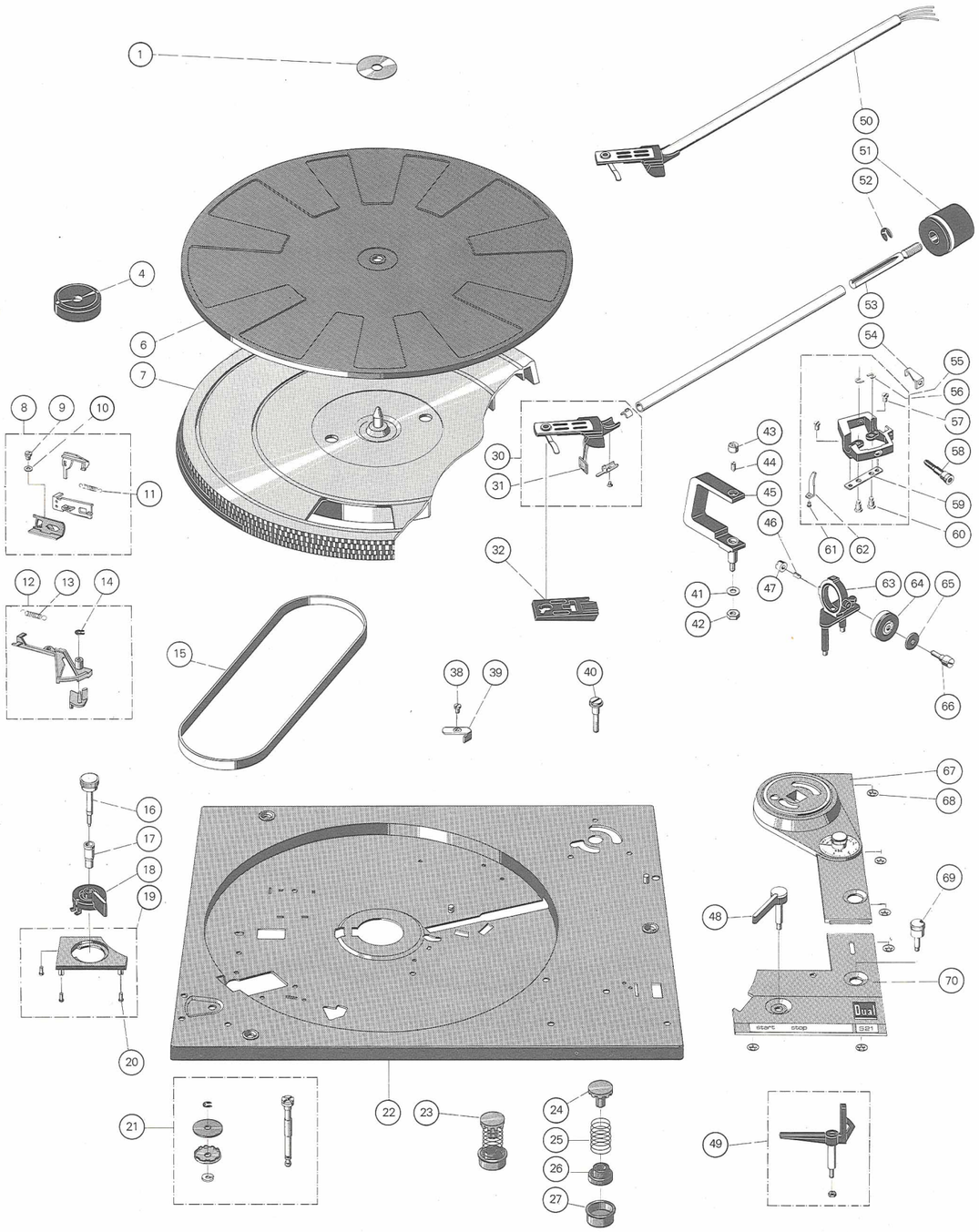


Fig. 22 Exploded view 1



Lubrication

All bearings and friction points were adequately lubricated in the factory. The most important bearings are of the oil-preservation type, so no lubrication is necessary in the first two years of normal use of the record player.
Use lubricants sparingly. Make sure no lubricant spoils the belt and pulley surfaces, which would cause slipping. Avoid finger contacts with these surfaces for the same reason.
Unspecified lubricants may become chemically decomposed.
To avoid resulting failures, we recommend application of the following lubricants at the points identically numbered in Fig. 23 and 24:

2 Renotac no. 342 adhesive oil

3 BP Super Viscostatic 10 W/30

4 Shell Alvania no. 2

5 Isoflex PDP 40

6. AK 500 000 Silicone Oil

8 Molykote

Fig. 23

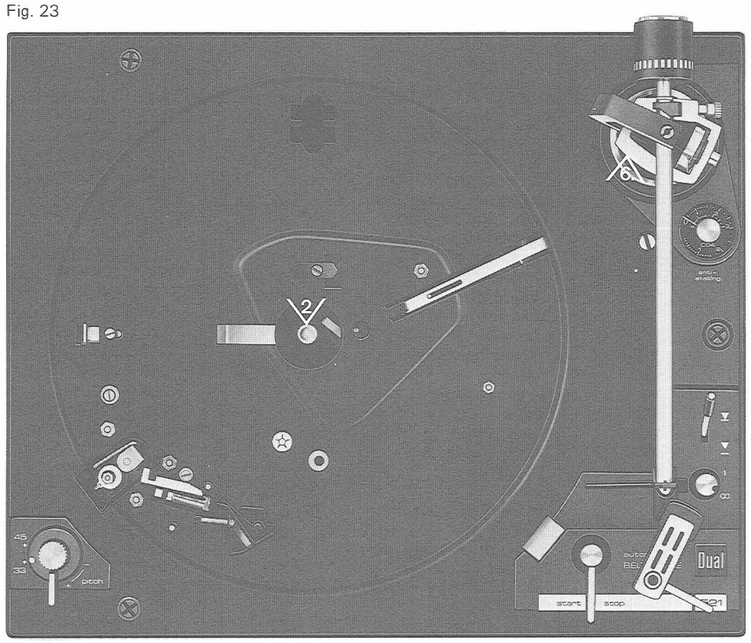
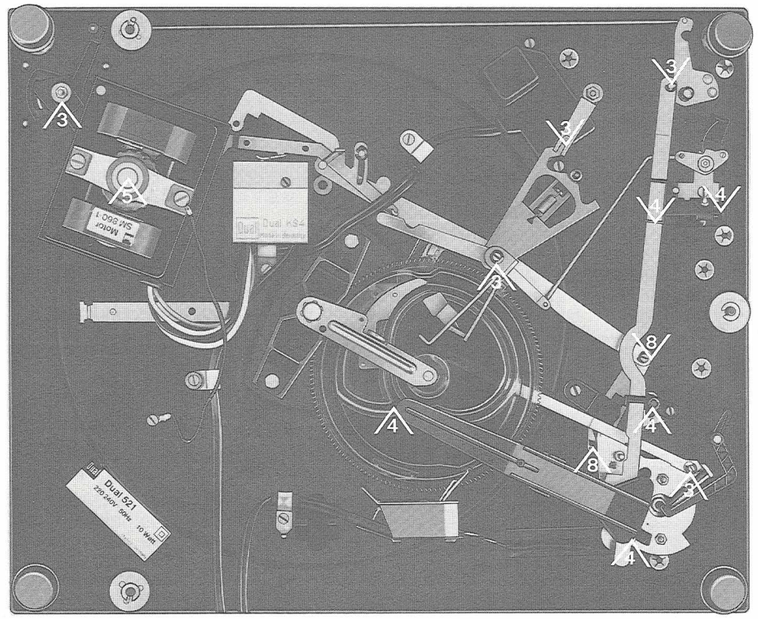


Fig. 24



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